Prognostic value of serum albumin and undeproteinized plasma pyridoxal 5'-phosphate

Dear Sir:

We concur with Dr. Agarwal et al. (1) that serum albumin (ALB) is the "simplest and best predictor of mortality" in elderly people. We have also found that serum albumin is the best predictor of health status (outcome) in a combined population of 1209 subjects, both healthy and hospitalized, of both sexes and ranging in age from 0 to 89 y. From stepwise regression, albumin explained 67.0% of the total variance and 80.52% of the explainable variance.

When used to predict mortality, albumin is quite specific but not optimally sensitive as noted by Dr. Agarwal. We found plasma undeproteinized pyridoxal 5'-phosphate (DPLP) to be a sensitive but not very specific predictor of mortality (Table 1). Log₁₀ of DPLP was the third index selected in the stepwise regression analysis for outcome, after albumin and hospital drug score. We thus hypothesized that this nutritional index, not considered by Dr. Agarwal, could, when used in conjunction with albumin, improve the predictive power of the albumin-mortality relationship.

### Table 1

<table>
<thead>
<tr>
<th>Cutoff Value</th>
<th>Albumin</th>
<th>DPLP</th>
<th>Albumin + DPLP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>0.7925</td>
<td>0.9434</td>
<td>0.9811</td>
</tr>
<tr>
<td>(42/53)</td>
<td>(50/53)</td>
<td>(52/53)</td>
<td></td>
</tr>
<tr>
<td>Specificity</td>
<td>0.9689</td>
<td>0.8019</td>
<td>0.9637</td>
</tr>
<tr>
<td>Predictive value</td>
<td>0.5385</td>
<td>0.1792</td>
<td>0.5352</td>
</tr>
<tr>
<td>(1120/1156)</td>
<td>(927/1156)</td>
<td>(1114/1156)</td>
<td></td>
</tr>
<tr>
<td>Predictive value</td>
<td>0.9903</td>
<td>0.9968</td>
<td>0.9991</td>
</tr>
<tr>
<td>(1120/1131)</td>
<td>(927/930)</td>
<td>(1114/1115)</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>0.9562</td>
<td>0.8081</td>
<td>0.9644</td>
</tr>
<tr>
<td>(1162/1209)</td>
<td>(977/1209)</td>
<td>(1166/1209)</td>
<td></td>
</tr>
</tbody>
</table>

* n = 1209; 6-mo mortality = 53/1209 = 0.0438
† Comparison between Albumin and Albumin + DPLP: chi-square = 9.816, 3 df, p = 0.0202
‡ Values below cutoff value are considered positive (indicative of probable death).

As illustrated in Table 1, albumin is more specific than DPLP whereas DPLP is more sensitive. By introducing a requirement that both indices should be less than a certain critical value, we were able to improve the sensitivity while maintaining the specificity and efficiency of the classification. Using DPLP in addition to albumin increased the reliability of the classification at a significance level of p = 0.0202.

Log₁₀ of DPLP correlated directly with serum albumin (r = +0.5225, p = 0.0001). Serum albumin also correlated with increment in DPLP in response to pyridoxine supplementation (r = +0.6269, p = 0.0001). Thus, a person's albumin status affects his vitamin B-6 status and also his ability to achieve an improvement in plasma vitamin B-6 in response to supplementation. This is not too surprising, because albumin is the main serum transport protein for PLP (2). Despite this close relationship between albumin and DPLP, both were still major independent predictors of outcome and mortality as we noted previously (3).

In the majority of cases, both serum albumin and plasma DPLP will be low in patients destined to die soon. PLP is required as a cofactor for > 100 enzymatic reactions, including the biosynthesis of the polyamines, which are in turn required for optimal macromolecular synthesis, including protein synthesis, which is required for growth, regeneration, and immune function. PLP is also required to synthesize serum albumin. Therefore, vitamin B-6 deficiency may prolong the hypoalbuminemic state and thus contribute to the lethal effects of hypoalbuminemia (4-6).

Richard Keniston
John I Enriquez, Sr
Ismael Delgado

Department of Clinical Investigation
William Beaumont Army Medical Center
El Paso, TX 79920-5001

References

LETTERS TO THE EDITOR


Reply to RC Keniston, JI Enriquez, Sr, and I Delgado

Dear Sir:

We are happy to note that Keniston et al have also observed that serum albumin is the best predictor of health status in a large group of patients. We agree that albumin has low sensitivity. However, it is inexpensive, readily available in all hospitals, and has been the most widely studied nutritional index.

DPLP is not available as a routine test and thus has no clinical application. Furthermore, when recommending the combined use of albumin and DPLP, the authors have increased the cutoff value of both albumin and DPLP. The cutoff value of albumin 38 g/L is not considered to be abnormal. Although there is increased sensitivity, there is no observable improvement in predictive values of positive and negative tests and efficiency. This only reiterates our conclusion that combination of other objective measurements provide no better information than that obtained with serum albumin alone.

Nanak R Agarwal
Department of Surgery
Our Lady of Mercy Medical Center
600 East 233rd Street
Bronx, NY 10466

Molybdenum content of human milk

Dear Sir:

The report by Bougle et al (1) on the molybdenum content of milk obtained from French mothers confirms our findings from the United States (2) of a concentration of 10–22 nmol/L after 1 mo postpartum. Although this does not negate the possibility that the wide range of levels reported elsewhere (3, 4) arises from geographical factors, it suggests that there may need to be a reappraisal of analytical methods as occurred with chromium (5). It is unfortunate that Bougle et al did not give any estimate of the accuracy of their analytical procedure.

Very little is known about the metabolism of Mo in the infant and any estimate of requirement must be an informed guess. I am concerned that in recommending an oral supplement of 2–3 μg·kg⁻¹·d⁻¹ for preterm infants Bougle et al are placing too much emphasis on our earlier estimate of fetal accumulation of Mo (6). This value (1 μg·kg⁻¹·d⁻¹) was based on extrapolation from the estimated adult body burden, which in turn was based on incomplete analytical data. At present our best estimate of the requirement by the young infants for Mo, as for other ultratrace elements, is likely to be the intake received by the fully breast-fed infant.

Clare E Casey
Department of Medicine and Therapeutics
University of Aberdeen
Aberdeen AB9 2ZD
Scotland, UK

References


Reply to CE Casey

Dear Sir:

The first question asked by C Casey concerns the accuracy of our analytical method. Its repeatability was assessed with mother’s milk as reference material. The standard error on 20 measures was 6.9%; the reproducibility for a period of 14 d was 7.3%.

The second part of Casey’s letter concerns the problem